Mathematical Concepts - Exam 1
MAT 117, Fall 2021 - D. Ivanšić

Name: $\qquad$
$I=\operatorname{Prt} A=P(1+r t) \quad A=P\left(1+\frac{r}{n}\right)^{n t} \quad A=P \frac{\left(1+\frac{r}{n}\right)^{n t}-1}{\frac{r}{n}} \quad P=P M T \frac{1-\left(1+\frac{r}{n}\right)^{-n t}}{\frac{r}{n}} \quad Y=\left(1+\frac{r}{n}\right)^{n}-1$

1. ( 6 pts ) 13 is 32 percent of which number?
2. (8pts) How much should be deposited now in an account bearing $4.18 \%$ interest, compounded quarterly, in order to have $\$ 2000$ in five years?
3. (10pts) A pair of sneakers with original price $\$ 99$ is on sale with an $18 \%$ reduction in price. A shopper bought the discounted pair in Kentucky, where sales tax is $6 \%$. What is the total amount she paid for the sneakers?
4. (8pts) You took out a loan of $\$ 500$ with simple interest rate $10 \%$ and repaid it with $\$ 562.50$. How long did you have the loan?
5. (14pts) Single mom Fiona, who has two children, files income taxes using the "head of household" filing status. She earned $\$ 54,000$ in wages, $\$ 690$ in interest, and deposited $\$ 7,000$ into a retirement account; she paid $\$ 6,200$ in mortgage interest, $\$ 1,400$ in property taxes, $\$ 3,100$ in state income taxes and donated $\$ 300$ to charity.
a) Find Fiona's gross income and adjusted gross income.
b) Use the table below to first determine Fiona's taxable income (don't forget the exemptions) and then find the tax on this income.

| Tax rate | Head <br> of Household |
| :---: | :--- |
| $10 \%$ | up to $\$ 13250$ |
| $15 \%$ | $\$ 13,250$ to $\$ 50,400$ |
| $25 \%$ | $\$ 50,400$ to $\$ 130,150$ |
| $28 \%$ | $\$ 130,150$ to $\$ 210,800$ |
| $33 \%$ | $\$ 210,801$ to $\$ 413,350$ |
| $35 \%$ | $\$ 413,351$ to $\$ 441,000$ |
| $39.6 \%$ | above $\$ 441,000$ |
| Standard <br> Deduction | $\$ 9300$ |
| Exemptions <br> (per person) | $\$ 4050$ |

6. (14pts) Angelo would like to save for a $\$ 14,000$ motorcycle.
a) How much should he deposit every week into an account with $4.75 \%$ interest, compounded weekly, in order to have $\$ 14,000$ in five years?
b) How much of the final amount is from deposits and how much from interest?
7. (32pts) True story: physician assistant Hayley Arceneaux spent three days in orbit on a SpaceX spacecraft. Made-up part: to house all the memorabilia connected to this flight, she decided to build an addition to her house costing $\$ 104,000$, financing it with a 15 -year loan at interest rate $2.34 \%$, compounded monthly.
a) What is her montly payment on the loan?
b) What are her total payments over the course of the loan? How much of this amount is for interest?
c) How much of her first payment goes toward interest, and how much towards the principal? d) What is the balance on the loan after 9 years?
8. (8pts) Bologna Bank is offering a $2.34 \%$ interest rate on an account that is compounded daily, while Salami Savings has an account with interest rate $2.32 \%$, compounded quarterly. Which account is the better deal?

Bonus. (10pts) Darius invested $\$ 5000$ in a mutual fund. Six years later, this investment had value $\$ 13,500$. Assuming annual compounding, at what annual rate did this investment grow?

